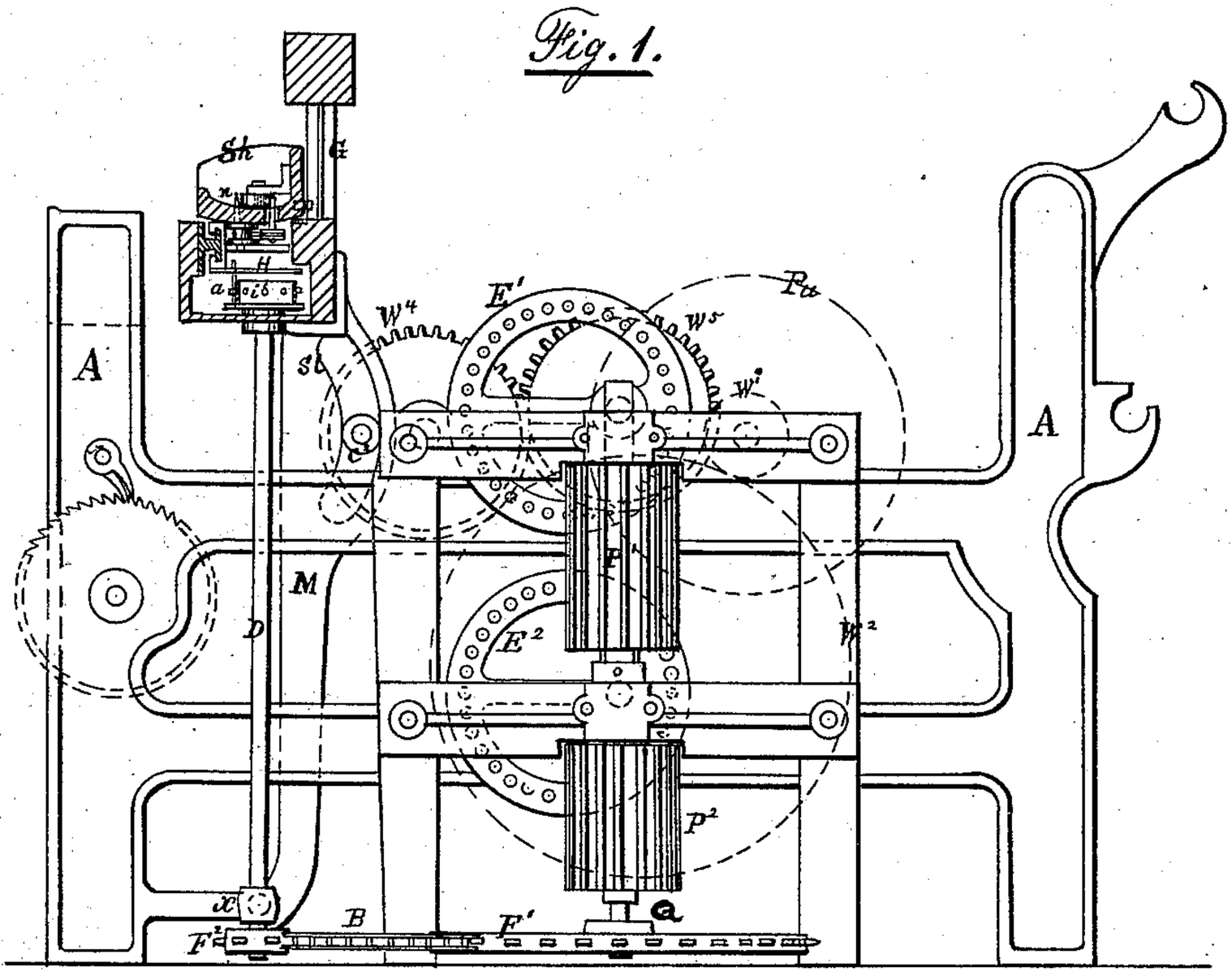
3 Sheets—Sheet 1.

G. CUTHBERT.

Shuttle-Motion for Looms.

No. 216,947. **Patented July 1, 1879.**

Fig. 1.



WITNESSES:

George Diemer

D. J. Gerecke.

INVENTOR:

George Cuthbert

3 Sheets—Sheet 2.

G. CUTHBERT.

Shuttle-Motion for Looms.

No. 216,947. **Patented July 1. 1879.**

Fig. 4.

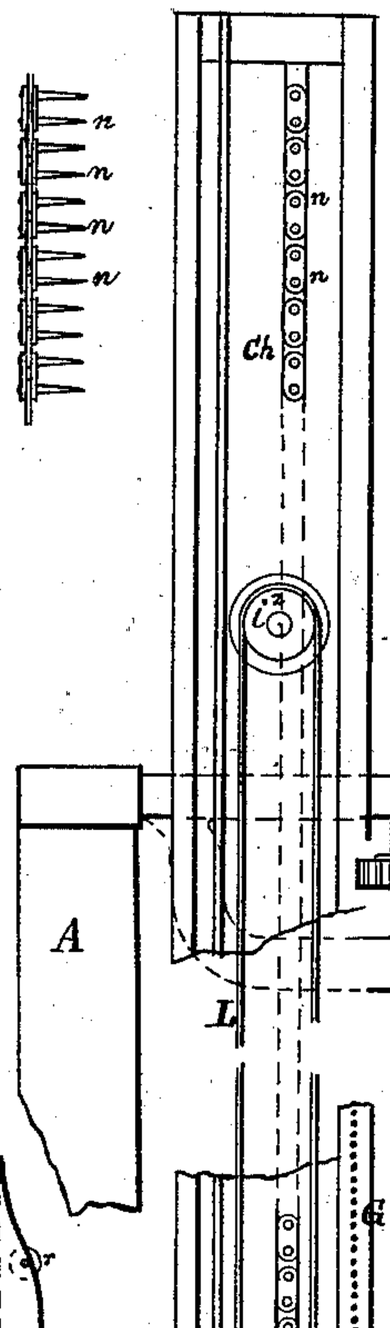
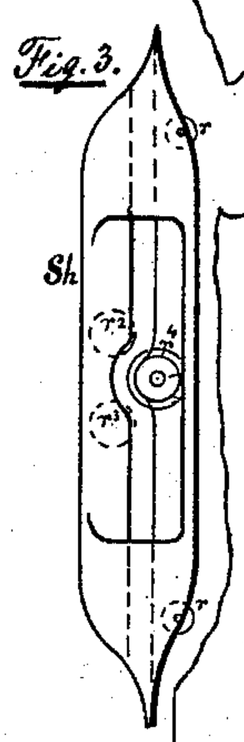
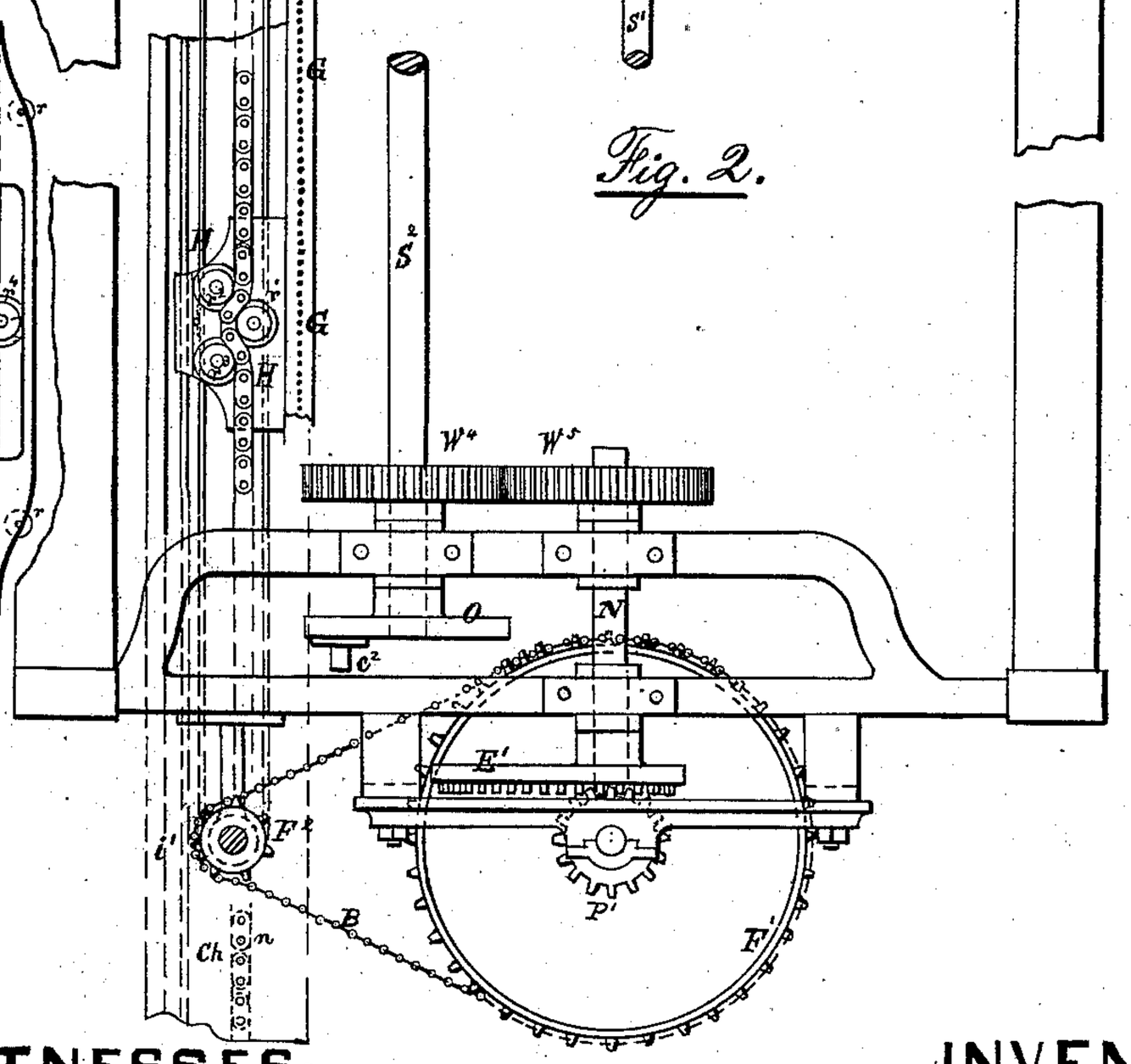


Fig. 2.

Fig. 3.





WITNESSES:

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INVENTOR:

George Cuthbert

3 Sheets—Sheet 3.

G. CUTHBERT.

Shuttle-Motion for Looms.

No. 216,947. Patented July 1, 1879.

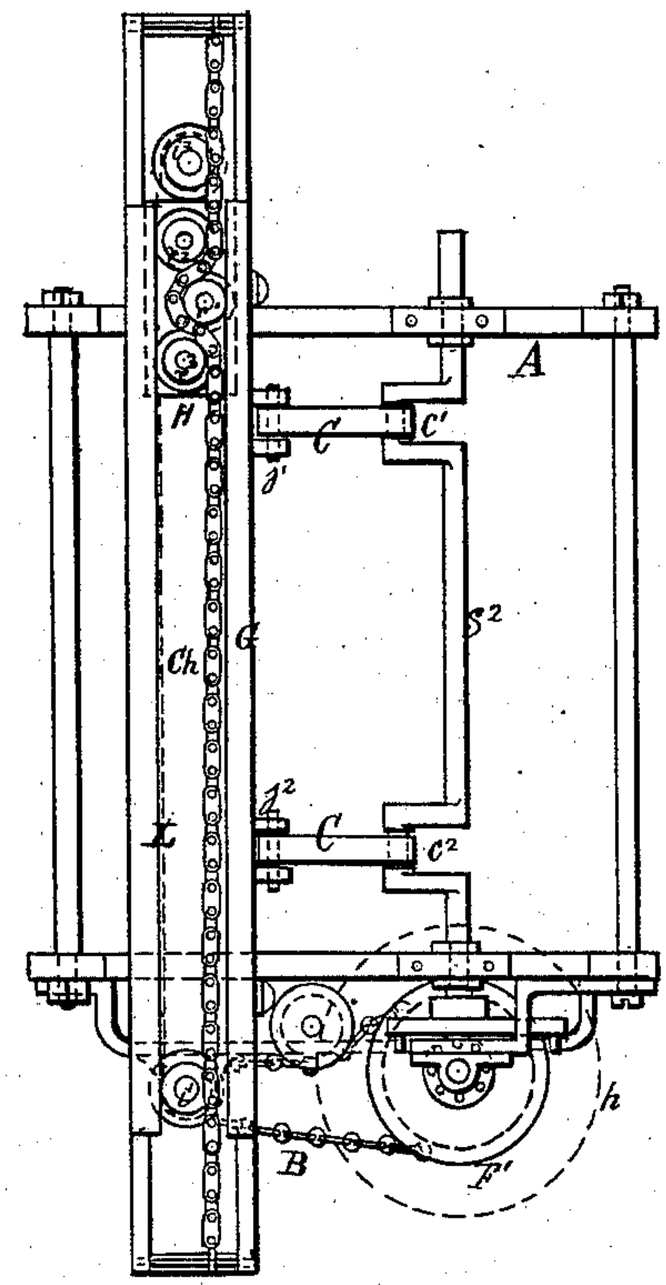

Fig. 5.

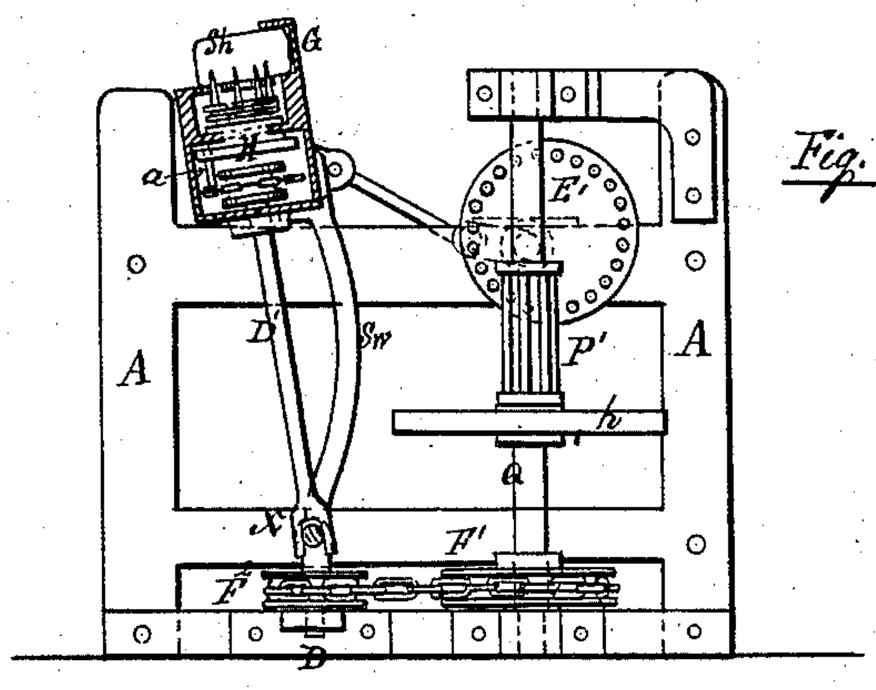

Fig. 6.

WITNESSES:

P. J. Gerecke

George Diemer

INVENTOR:

George Cuthbert

UNITED STATES PATENT OFFICE.

GEORGE CUTHBERT, OF MATTEAWAN, ASSIGNOR OF ONE-HALF HIS RIGHT TO CHARLES H. KIMBALL AND WILLIAM G. KIMBALL, OF NEWBURG, NEW YORK.

IMPROVEMENT IN SHUTTLE-MOTIONS FOR LOOMS.

Specification forming part of Letters Patent No. **216,947**, dated July 1, 1879; application filed June 26, 1878.

To all whom it may concern:

Be it known that I, GEORGE CUTHBERT, of Matteawan, in the county of Dutchess and State of New York, have invented a Direct-Power Loom, of which the following is a specification.

The object of my invention is to provide a loom for weaving low stock with a mechanism which keeps the shuttle within the continuous control of the driving-power, so that at any point in its course through the race the shuttle is firmly held on the shuttle-carrier, and that no throwing of the shuttle is needed at either end. The motion of the shuttle must be such as will not interfere with the vibration of the lay, the shuttle must have passed out the warp before the lay closes up the race, and its speed must be so arranged that its momentum toward the ends of each passage is gradually reduced to such a degree that the shuttle will not be thrown from the carrier. This irregular speed of the shuttle-carrier and shuttle during one passage through the warp is attained by the employment of eccentric or elliptic gearing in the mechanism to drive the shuttle-carrier. The shuttle-carrier is guided in its course in slides the entire length of the lay, and is moved forward and backward by a pin fastened to a belt or chain, which passes over two pulleys or sprocket-wheels inside the lay, and which are driven through appropriate connecting mechanism by the eccentric-gearing. On the upper side of the carrier are three rollers, and winding between them is a stationary chain, stretched through the lay, said rollers being so arranged as to form a bend in the chain. This chain, being provided with pointed pins in its joints, projecting one to one and one-half inch above the chain, is lifted up by the shuttle-carrier when passing along, and the pins project through the lower shed. The shuttle, being provided at its bottom with a roller corresponding with the bend in the chain around the middle roller, sits on the carrier, with the threads of the lower shed between the shuttle and carrier; and the points of the chain, fitting around the roller on the shuttle, keep the same in position on the carrier while the carrier is moving through the lay.

To describe the invention more clearly, I refer to the accompanying drawings, in three sheets, in which—

Figure 1 on Sheet 1 is a side view of a loom embodying a modification of my shuttle mechanism. Fig. 2 on Sheet 2 is a plan of the same. Fig. 3 on Sheet 2 is a plan of the shuttle lifted from its position on the shuttle-carrier. Fig. 4 on Sheet 2 is a side view of the chain with the projecting points. Fig. 5 on Sheet 3 is a plan view of a loom embodying my improved shuttle-operating mechanism in its simplest and preferred form. Fig. 6 on Sheet 3 is a side view of the same.

Similar letters of reference marked on the different sections denote the same parts.

In the drawings are left out all parts of the loom which are not needed to show the device for moving the shuttle. All cams for the change of the shed at the proper time and all rollers for the yarn or finished cloth are omitted.

Proceeding with the description of the drawings on Sheet 3, A A represent the side frames of the loom, with braces, &c., to hold the frames in position. S^2 is the shaft, which, by its two cranks, c^1 and c^2, and connections C C, cause the vibrations of the lay around the axis X.

At the end of the shaft S^2 is keyed on an eccentric or elliptic wheel, E^1, with teeth on its side, gearing into a long vertical pinion, P^1, on the shaft Q. While the shaft S^2 is revolving at even speed, this elliptic gear E^1 gives to the pinion P^1 an uneven speed during one revolution of the shaft S^2.

When the teeth at the shortest radius are in gear with the pinion P^1, the shaft Q turns slow, and keeps increasing in speed until the teeth at the largest radius are in gear with the pinion P^1, when the shaft Q turns quickest, and its motion decreases until a whole revolution of the wheel E^1 is completed. This repeats itself at every revolution of the shaft S^2.

At the lower end of shaft Q is fastened a horizontal sprocket-wheel, F^1, from which the

motion is transmitted to a smaller corresponding sprocket-wheel, F^2, by a chain, B. F^2 is on the lowest end of a vertical shaft, D, the upper end of which, D′, is vibrating with the lay around the axis X. The upper end of the shaft D′ is guided in the lay, and carries a small horizontal sprocket-wheel, i^1, over which runs a chain, L, the whole length of the lay over another wheel or pulley, i^2, at the other end of the lay. At one point in this chain L is fastened a vertical pin, *a*, which enters into a transverse slot in the bottom plate of the shuttle carrier or driver H, and which pulls the shuttle-carrier H forward and backward through the lay.

The length of travel of the shuttle-carrier H is determined by the distance of the two outer edges of the wheels i^1 and i^2 over which the pin *a* has to pass on every passage forward or backward. For every one such passage either way, the shaft S^2 makes one revolution, the lay makes one vibration, and one change of shed takes place when the carrier arrives at either end, and before the shuttle starts on a new passage through the race. Therefore the mechanism to move the shuttle must be positive, that no slipping of the chain and no change of time can take place when the machine is in operation.

The irregularity of the motion is accomplished by the eccentric or elliptic gearing E^1 and pinion P^1, and as the shuttle has to travel fastest when in the middle of the race, the teeth of the gear E farthest away from the center of shaft S^2 have to be in gear with the teeth of the pinion P^1 when the shuttle is in that position.

The more eccentric or elliptic the gear E^1 is, the greater is the difference in the speed; and if the difference in speed is not sufficient, which can be got by employing one eccentric-gear, E^1, and one pinion, P^1, the difference can be increased by repeating the same, as shown in Fig. 1 on Sheet 1. In this case the pinion P^1 is loose on its shaft, and acts as an intermediate gear to drive the second eccentric-wheel, E^2, which is a duplicate of E^1. This second wheel, E^2, gears into a second vertical pinion, P^2, which is fast on the shaft Q, and which has the same number of cogs as P^1. These two gears E^1 and E^2 are placed in such a position that if the teeth at the long radius in E^1 are in contact with pinion P^1, at that time the teeth at the short radius of E^2 are in the same pinion P^1, and the teeth at the long radius of E^2 are in gear with the pinion P^2—that is, at that time the shaft Q is turning at its fastest possible speed, and twice faster than it was possible with only one pair of eccentric-wheels, E^1 and P^1.

If the cogs at the short radius of E^1 are in operation, the pinion P^1 is engaged with its cogs at the long radius in E^2 and the opposite side of E^2 is turning the pinion P^2, or the shaft Q is turning at its slowest speed, and only half as fast as with the employment of one elliptic wheel, E^1.

The irregularity in speed is carried forward by the sprocket-wheels F^1 and F^2 to the smaller wheels i^1 i^2 and to the shuttle-carrier H and shuttle Sh.

The shuttle-carrier H is a horizontal plate, guided at both sides in the lay. On top of the plate are three rollers, r^1 r^2 r^3, Fig. 2, fastened in such a way that the chain Ch has to curve or bend while passing between them. The chain Ch is a stationary chain, fastened at each end, stretched through the lay, and the pins connecting the links project about one to one and one-half inch above the chain, and are pointed at the ends.

The shuttle Sh sits on the carrier H, and has attached a roller, r^4, at the bottom, which fits right over the roller r^1 on the carrier, so that the pins *n n* of the chain pass close around the roller r^4, and through a slot left in the bottom of the shuttle. This curve in the chain Ch holds the shuttle Sh in its position on the carrier, while two small friction-rollers, *r r*, on the side of the shuttle prevent any great friction of the shuttle against the reed G.

The shuttle is not held to the carrier by any other means. Therefore the warp can always move while the shuttle is moving through the race.

The chain Ch, by its own weight, sags down so that the points *n n* of the chain are below the lower shed, and only where the chain is running over the carrier it is raised enough that the points *n n* catch around the roller r^4 at the bottom of the shuttle to hold it in position.

Instead of a chain, L, to drive the carrier H, a belt may be used, in which case the driving-pulley i^1 is provided with pins on its face about one inch apart, and corresponding holes are punched in the belt to prevent slipping of the belt, as the motion must be positive.

In Fig. 2 on Sheet 2 the loom is represented more complete, showing in Pu the pulley for the moving power; F, the friction-clutch by which the loom is started; S^1, the cam-shaft, driven by the gears W^1 W^2, which shaft drives all cams, rollers, &c., of the loom.

From the wheel W^2 the pinion W^3 on shaft S^2 derives its motion, and on the same shaft is the crank-wheel O, with crank-pin c^2, while a similar crank-pin, c^1, is in the pinion W^3. These pins c^1 c^2 work in a slot, Sl, in the swords M, Fig. 1, and cause the vibration of the lay.

The wheel W^4 drives another one of same size, W^5, on shaft N, which shaft carries the elliptic or eccentric wheel E^1, from which all the other gearing is driven, which actuates the shuttle in the same manner as described before.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The eccentric or elliptic wheel E^1, the pinion P^1, and mechanism for actuating the same, in combination with the shuttle-carrier H, shuttle Sh, and connecting mechanism, substantially as and for the purpose set forth.

2. The stationary chain Ch, provided with the points *n n*, and the shuttle Sh, having roller r^4, in combination with the shuttle-carrier H, provided with rollers r^1 r^2 r^3, and mechanism, substantially as described, for actuating the same, for the purpose set forth.

GEORGE CUTHBERT.

Witnesses:
J. W. GERECKE,
GEORGE DIEMER.